

ACCIDENT RESPONSE AND INVESTIGATION PLAN

**Department of Transportation
Office of Commercial Space Transportation**

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REVISION A

TABLE OF CONTENTS

TABLE OF CONTENTS	1
1. INTRODUCTION	1
2. PURPOSE	1
3. DEFINITION OF TERMS	2
4. INVESTIGATION RESPONSIBILITIES	4
4.1 OCST	4
4.2 NTSB	4
4.3 Commercial Operator	4
4.4 Range Operator	6
5. OCST INVESTIGATIVE ROLE	6
5.1 OCST Support to NTSB	6
5.2 OCST as Investigative Authority	6
6. PROCEDURES	8
6.1 OCST Investigations	8
6.2 NTSB Investigations	10
6.3 Other Investigations	11
7. NOTIFICATION ROLES AND RESPONSIBILITIES	11
APPENDIX A	13
APPENDIX B	14

1. INTRODUCTION

The Commercial Space Launch Act of 1984, as amended, authorizes the Secretary of Transportation to oversee and coordinate United States commercial launch activities. The Secretary's mandate embraces the authority to license and otherwise regulate such activities, as well as the responsibility to encourage, facilitate and promote establishment of a competitive United States commercial space transportation industry. In carrying out these responsibilities, the Secretary is authorized to initiate investigations and inquiries for the purpose of enforcing the statute.

On June 5, 1989, the Department of Transportation's (DOT's) Office of Commercial Space Transportation (OCST) and the National Transportation Safety Board (NTSB) executed Appendix H to the Reimbursable Memorandum of Agreement between DOT and NTSB. Appendix H outlines the relationship between OCST and NTSB and NTSB's role in commercial space transportation accident investigations. Specifically, NTSB, as the government's independent accident investigation agency, will investigate certain types of commercial space transportation accidents. However, subject to the provisions of section 304(a)(1) of the Independent Safety Board Act of 1974, as amended, nothing in Appendix H impairs OCST's authority under the Commercial Space Launch Act to conduct investigations of accidents under applicable provisions of law or to obtain information directly from parties involved in, and witnesses to, a commercial space launch accident.

2. PURPOSE

The purpose of this plan is to identify and define the responsibilities of the various parties involved should an accident, incident, or other occurrence (as defined herein) occur for which OCST has responsibility. In so doing, the plan:

- o Defines terms.**
- o Identifies reportable accidents, incidents, and other occurrences.**
 - Accidents that NTSB would investigate.**
 - Incidents and other occurrences that OCST would investigate, participate in, and/or request a report for.**
- o Describes the reporting and response roles and responsibilities of OCST, NTSB and Commercial Operators.**
- o Defines categories of events as to which OCST requests representation from other agencies and/or a copy of the final documentation.**

3. DEFINITION OF TERMS

Accidents/Incidents/Other Occurrences:

Accident: The term "accident" is typically defined in broad terms as something that occurs unexpectedly or unintentionally, an undesirable event. For purposes of this document the term "accident" is defined more specifically as follows:

An unplanned event occurring during commercial space launch activities resulting in:

- o Known impact of a commercial launch vehicle, its payload or any component thereof outside the impact limit lines designated by the launch range facility; or**
- o A fatality or serious injury (as defined in 49 CFR 830.2) to any person who is not associated with commercial space launch activities and who is not located on the launch range facility; or**
- o Any damage estimated to exceed \$25,000 to property that is not associated with commercial space launch activities and that is not located on the launch facility."**

Incident: An unplanned event occurring during commercial space launch activities, other than an accident, involving a malfunction of the flight safety system or failure of the licensee safety operations plan which affects or could affect public safety. A failure of the safety operations plan could include actions taken or not taken by the commercial operator or range operator.

Other Occurrence: Includes any unplanned events occurring during commercial space launch activities, other than an accident or incident, which result in any of the following:

- 1) Property Damage: Greater than \$25,000 damage to -**
 - o a commercial payload,**
 - o a launch vehicle,**
 - o a support facility, or**
 - o government property**
- 2) Personnel Injury: A fatal or serious injury, as defined herein, of a civilian or a launch team member occurring in a launch related area or facility.**

3) Mission Failure: A failure to complete the mission as planned.

Commercial Operator: A non-governmental entity licensed by OCST to conduct commercial space launches and its contractors.

Commercial Space Launch: A space launch authorized to be conducted under a license issued by OCST.

Fatal Injury: As defined in 49 CFR sec. 830.2, a fatal injury means "an injury that results in death within 30 days of the accident".

Flight Safety System: A generic term referring to airborne/ground systems involved in, but not necessarily limited to tracking, evaluating, or command and control of a commercial launch vehicle, that is necessary to protect public safety. Examples include all tracking, display and flight termination systems used during a commercial activity.

Flight Termination System (FTS): An FTS is a safety system designed to cause thrust termination of any stage, at any time in flight from launch to orbital insertion or impact.

Investigator In Charge (IIC): The IIC is the person appointed by the investigating agency to organize, conduct, and control all phases of an investigation.

Impact Limit Line (ILL): A line predetermined in advance of the launch establishing a boundary beyond which a launch vehicle or any portion thereof, or its cargo, will not be allowed to impact. A major function of the ILL is to provide for public safety.

Launch Vehicle: Any vehicle constructed for the purpose of operating in, or placing a payload in, outer space, and any suborbital rocket.

National Transportation Safety Board (NTSB): An independent governmental agency charged by P.L. 93-633 (Independent Safety Board Act of 1974, Title III) with investigation of accidents that occur "in connection with the transportation of people or property which, in the judgment of the Board, is catastrophic, involves problems of a recurring character, or would otherwise carry out the policy of this title." (Section 304(a)(1)(F)).

Probable Cause: Based on the available facts/data, the event(s) determined by the investigation team to be the most likely cause of the accident/incident.

Public Area: Any area outside of the confines of the launch range property.

Range Operator: A government entity (e.g. the Eastern Space and Missile Center, the Western Space and Missile Center, White Sands Missile Range, Wallops Flight Facility), or a commercial entity (none currently in existence) providing one or more range

functions (e.g., manpower, facilities, tracking instrumentation, data collection, safety, etc.).

Serious Injury: As defined in 49 CFR sec. 830.2, a serious injury "means any injury which: (1) Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface."

4. INVESTIGATION RESPONSIBILITIES (Table 1)

4.1 OCST:

OCST is responsible for investigating:

- o all licensed commercial space launch accidents, not investigated by NTSB. In addition, OCST may undertake a separate accident investigation to that conducted by NTSB.**
- o incidents.**
- o violations of the conditions of a license issued by OCST that affects safety.**

OCST may investigate other occurrences, and participate in and/or require a copy of the final determination of a commercial operator's investigation.

4.2 NTSB:

NTSB is responsible for investigating all commercial space launch accidents outlined in Appendix H to the "Reimbursable Memorandum of Agreement" between DOT and NTSB (see Appendix A)

4.3 Commercial Operator:

A commercial operator is responsible for establishing an accident investigation plan identifying the procedures and criteria by which the commercial operator will investigate accidents, incidents and other occurrences. The plan shall identify the commercial operator's procedures for:

- o reporting an accident/incident/other occurrence to OCST.**
- o securing data and off-range wreckage pertaining to an accident/incident/other occurrence.**

RESPONSIBILITIES

NTSB

- Accidents**
 - Impact outside Impact Limit Line**
 - Fatality/Serious injury occurring off-range**
 - Property damage off-range exceeding \$25,000**
- Events subject to Section 304(a)(1)(F) of the Safety Board Act of 1974**
- Other events agreed to by NTSB and OCST**

OCST

- Accidents not investigated by NTSB**
- Parallel accident investigation to an NTSB Investigation**
- Incidents**
 - Malfunction of flight safety system**
 - Failure of safety process**
- Violations of license**
- Other occurrences**

Commercial Operator

- Establish accident investigation plan**
- Independent investigation to OCST or NTSB investigations**

Range Operator

- Independent investigation to OCST or NTSB investigations**

Table 1

- o cooperating with the responsible investigating authority during an investigation.**

- o providing, within applicable provisions of law, copies of all reports and other data pertaining to an accident/incident/other occurrence as may be required by OCST.
- o supporting an accident/incident/other occurrence investigations being carried out by NTSB and/or OCST.

The commercial operator may choose to conduct its own investigation of accidents, incidents or other occurrences independent of any OCST investigation. A commercial operator's investigation shall not interfere with any on-going OCST investigation.

4.4 Range Operator:

The range operator may conduct its own investigation independent of any OCST investigation. Nothing in this plan precludes the range operator from investigating those events not subject to the investigative authority of OCST or NTSB and that effect range property.

5. OCST INVESTIGATIVE ROLE

5.1 OCST Support to NTSB

For accidents that NTSB is responsible for investigating, OCST will provide an OCST Coordinator to participate as a working team member on the NTSB investigation team. The OCST Coordinator will be a government employee and will be selected directly by the Director, OCST or Associate Director for Licensing Programs (ADLP), OCST. In conducting his/her activities, the OCST Coordinator will work with the NTSB Investigator in Charge (IIC). Selection of other OCST personnel to participate in the investigation shall be determined by the OCST Coordinator and subject to approval by the NTSB IIC.

5.2 OCST as Investigative Authority

The OCST investigation will focus primarily on, but not be limited to, the following issues:

Safety Failures

- o Failure of the Launch Vehicle Flight Safety System and the causes of such failure.
- o Significant failure of the ground command system and causes thereof.

- o **Significant failures/errors of the range safety tracking and data acquisition systems and/or in the computer and display systems utilized for public safety protection and the causes of such failures.**
- o **Failures in the planning, approval and operations processes leading to erroneous or misleading decisions that contributed to increased public risk.**
- o **Failures of critical systems resulting in unplanned reentries that increased public risk.**
- o **Failures of vehicle guidance or other component resulting in:**
 - **Collision with another spacecraft.**
 - **Increased risk to other operational spacecraft.**
 - **A substantial increase in space debris.**

Violations

- o **Violation of a term or condition of a license, or OCST-established safety regulations.**

OCST may initiate its own accident investigation during an on-going NTSB investigation when there are apparent license violations.

In fulfilling its duties under the Commercial Space Launch Act, OCST may (1) investigate, (2) take part in the commercial or range operator's investigation, either as a participant in the investigation or as an observer, (3) designate an OCST representative to track the investigation process, (4) require a copy of the final investigation report, (5) obtain a follow-up hard copy of any verbal report, and (6) require clarification and/or re-accomplishment of specific portions of a final report so submitted.

6. PROCEDURES

6.1 OCST Investigations

Purpose. The purpose of an OCST investigation is to determine the probable cause of an incident or other occurrence as accurately as possible and/or determine if there was a violation and make recommendations to the ADLP, that, if implemented, will limit or significantly reduce the reoccurrence of such event. In order to accomplish this objective, the OCST investigation team will take action to:

- o Determine probable cause (within the scope above) and identify and recommend corrective actions that should be implemented to prevent recurrence.**
- o Determine if current OCST licensing practices, regulations and standards are adequate to protect against property damage and public injury and recommend necessary changes.**
- o Determine whether there was a violation of OCST regulations or the license terms or conditions.**

General Procedures. The following general procedures govern investigations conducted by OCST:

- o The OCST Director or ADLP shall appoint an IIC and an investigation team to carry out the investigation.**
- o The investigation will be under the control and direction of the OCST IIC.**
- o OCST will be solely responsible for releasing factual information of the investigation to the public and will designate the official spokesperson for the investigation.**
- o Group leaders assigned to a particular investigative groups will work under the direction of the OCST IIC and will remain with the assigned group until that phase of the investigation has been completed or they are released by the OCST IIC. Group leaders will submit to the OCST IIC whatever information they obtain during the course of the investigation.**
- o The OCST IIC will keep the team informed of the progress of the investigation.**
- o Pertinent records obtained and factual reports prepared during the investigation shall be made available to the OCST IIC in a timely and orderly manner.**
- o In the event additional facts are needed by OCST during an on-going NTSB investigation, the OCST Coordinator may obtain them following notification to the NTSB investigator-in-charge. In obtaining such facts, the OCST Coordinator will not interfere with any on-going NTSB investigation. OCST personnel will make it clear that they are not acting under NTSB direction. The OCST Coordinator will notify the NTSB investigator-in-charge of any OCST intent to take any enforcement action, if the NTSB investigation is not yet completed.**

- o **Wreckage or records will not be released until OCST has determined that they are no longer needed. In the event OCST requests NTSB to retain control of any wreckage for a period of time beyond NTSB's investigative needs, that period of time shall not exceed 60 days from the date of request. OCST shall be responsible for the storage and security costs, if any, for this additional time.**

Team selection. The OCST IIC and other OCST investigation team members, to include consultants and advisors, are appointed by the Director or ADLP. Consultants and advisors may be government employees, contractors, commercial operators or range operators, industry representatives or other members of the public. After the initiation of an investigation, if the IIC determines that additional team members are required, additional team member names may be submitted to the Director or ADLP by the IIC for approval.

Consultants and advisors will be selected on the basis of their knowledge and experience in the following areas:

- Range Safety**
- Flight Safety**
- Reliability and Quality Control (safety procedures)**
- Launch Vehicle Operations**
- Risk Analysis**

In most instances an individual may be qualified in more than one area.

Team organization. The IIC is responsible for determining the organization required for an investigation team and the responsibilities of the team members. Members will perform investigation tasks, complete appropriate forms, recommend corrective action, and submit findings and recommendations to the IIC. The IIC may designate one of the team members to provide administrative support to the team or may request a separate administrator.

Gathering data/ facts/testimony. When conducting an investigation, OCST may, pursuant to the Commercial Space Launch Act, request the range operator, commercial operator, or other participants to provide, under applicable provisions of law, all appropriate safety and range data documentation pertaining to safety issues, including, but not limited to, flight anomalies, significant equipment failure, range safety actions and casualties.

Preparing investigation report. OCST shall prepare a final report to include a narrative description and analysis of how and why the event occurred, findings, probable cause(s), and recommendations. If NTSB has conducted an investigation, NTSB's accident report may be incorporated into OCST's report by reference and/or as an attachment where applicable.

6.2 NTSB Investigations

The following general procedures govern OCST's participation in investigations of commercial space launch accidents by NTSB:

- o OCST shall be designated by NTSB as a party to each accident investigation and public hearing, and will in turn designate a principal representative as the OCST coordinator for each accident.**
- o Selection of other OCST personnel to participate in the investigation shall be determined by the OCST Coordinator subject to approval by the NTSB IIC. In conducting his/her activities, the OCST Coordinator shall work with the NTSB IIC in conducting an investigation.**
- o OCST personnel assigned to a particular investigative group shall work under the direction of the group chairman and shall remain with the assigned group until that phase of the investigation has been completed or they are released by the NTSB IIC and the OCST coordinator. They will submit to the group chairman whatever information they obtain during the course of the investigation.**
- o Pertinent records obtained and factual reports prepared by NTSB during the investigation shall be made available to OCST through the OCST Coordinator in a timely and orderly manner.**
- o In the event additional facts are needed by OCST but not required by NTSB, they may be obtained following notification to the NTSB IIC. In obtaining such facts, OCST personnel will make it clear that they are not acting under NTSB direction. The gathering of such facts will not interfere with the ongoing NTSB investigation. The OCST Coordinator will notify the NTSB IIC of any OCST intent to take any enforcement action, if the NTSB investigation is not yet completed.**
- o The NTSB IIC shall not release any wreckage until OCST agrees that it is no longer needed. In the event OCST requests NTSB to retain control of any wreckage for a period of time beyond NTSB's investigative needs, that period of time shall not exceed 60 days from the date of request. OCST shall be responsible for the storage and security costs, if any, or this additional time.**

NTSB and OCST will each provide to the other copies of all accident reports, research reports, studies and other documents normally available to the public upon request. In addition, NTSB and OCST shall each have access to the other's accident data files and tapes on a continuing basis.

6.3 Other Investigations

For investigations that a commercial operator or range operator may conduct, OCST may request that a copy of the final report or final documentation be furnished to OCST. OCST may require clarification and/or re-accomplishment of any portion of the final report if relevant issues are not adequately addressed. OCST may take part in such an investigation, either as a participant or an observer, or be represented in the investigation by a designated representative.

7. NOTIFICATION ROLES AND RESPONSIBILITIES

This section discusses the notification roles and responsibilities of OCST, NTSB and the commercial operator in the event of an accident, incident or other occurrence. It is essential that the proper agency be notified in accordance with the procedures outlined herein, so that the proper investigation process can be implemented.

- o Accident: Immediately upon occurrence of a commercial space launch accident, the commercial operator will immediately notify the Federal Aviation Administration (FAA) Operations Center at (202) 267-3333 available 24 hours a day. The FAA Operations Center shall then notify both NTSB and OCST of the accident.**

For accidents NTSB investigates, OCST and NTSB will exchange information regarding their respective personnel participating in the investigation, i.e. names, locations, contact points, etc.

The commercial operator will complete and forward to OCST the Accident/Incident Notification Report, Appendix B, within 5 days of occurrence of the accident irrespective of NTSB, OCST or range operator actions. This report will document the facts, conditions and circumstances associated with the incident. Additional information may be requested by OCST at a subsequent time.

- o Incident: OCST shall be notified immediately by the commercial operator in the case of an incident. During normal working hours (0900 to 1730 Eastern Time) Monday through Friday notification may be made directly to OCST at (202) 366-2929. After normal working hours or on weekends or holidays, notification shall be made directly to the FAA Operations Center at (202) 267-3333 with explicit instructions to notify OCST on the next working day.**

The commercial operator will complete and forward the Accident/Incident Notification Report, Appendix B, within 5 days of occurrence of the accident irrespective of NTSB, OCST or range operator actions. This report will document the facts, conditions and circumstances associated with the incident. Additional information may be requested by OCST at a subsequent time.

- o Other Occurrences:** The commercial operator shall notify OCST within 24 hours of the occurrence or on the next working day should the occurrence happen on a holiday or a weekend. Notification will be made to OCST at (202) 366-2929. Notification should include date, time, location, fatalities, injuries, damage to vehicle or payload and any slippage in the launch schedule that may occur.

When it is not clear which agency (NTSB or OCST) should be notified because an event may be classified as either an accident or incident, notification shall immediately be to the FAA Operations Center at (202) 267-3333 with explicit instructions for the FAA Operations Center to notify both OCST and NTSB. The information initially reported should include the time, location, and a brief description of the event as well as the name and phone number of the lead investigator for the commercial operator's investigation team or a central point of contact if an investigator has not been appointed.

APPENDIX A

Excerpts from "Appendix H to the Reimbursable Memorandum of Agreement Between Department of Transportation and National Transportation Safety Board, May 15, 1975 as amended June 5, 1989."

"NTSB will investigate all commercial space launch accidents resulting in:

- a. Known impact of a commercial launch vehicle, its payload or any component thereof outside the impact limit lines designated by the launch range facility; or**
- b. A fatality or serious injury (as defined in 49 CFR 830.2) to any person who is not associated with commercial space launch activities and who is not located on the launch range facility; or**
- c. Any damage estimated to exceed \$25,000 to property which is not associated with commercial space launch activities and which is not located on the launch facility.**

NTSB may investigate any other commercial space launch accident which, in the judgement of the Board, is subject to Section 304(a)(1)(F) of the Independent Safety Board Act of 1974."

Any other investigations of commercial space launch accidents by NTSB, other than those described above, will be subject to the mutual agreement of NTSB and OCST.

